

KINDS OF CYSTOPTERIS IN CALIFORNIA.—Recently John Thomas Howell, while preparing a floristic account of the ferns of the Sierra Nevada, suggested to me a study of the two spore types of Brittle Bladder Fern in that area. I enlarged the project's scope to include all the California collections of *Cystopteris* in the California Academy of Sciences herbarium, more than 120 spore-bearing collections.

Based on spore characteristics, two separate taxa are recognizable, although in general appearance they look identical. Profumo<sup>1</sup> examined the gametophytes of the two types and also found no morphological differences. At times, the two types have been considered separate species, *C. fragilis* (L.) Bernh., with spiny spores, and *C. dickieana* Sim, with non-spiny (rugose-verrucose) spores; the two have also been considered subspecies.

The specimens I examined show that both kinds may occur in the same locality, a fact which was recognized by Profumo and by Hagenah,<sup>2</sup> who occasionally found both mounted on the same herbarium sheet.

Within the Sierra Nevada, 14 collections were the *fragilis* type and 67 the *dickieana* type, a noteworthy excess of the latter. Non-Sierran collections showed 22 *fragilis* type and 20 *dickieana* type, a more even distribution. While both kinds occasionally may occur together, there appears to be a predominance of the *dickieana* type at higher elevations. This corresponds to the findings of Larsen<sup>3</sup> in Greenland, who suggested that *C. dickieana* was a high Arctic species and that *C. fragilis* was a sub-Arctic species.

Perhaps these two taxa should be considered as forms rather than subspecies since their distributions are essentially identical and the only apparent difference is in their spores.—ROBERT B. SETZER, Allan Hancock Foundation, Dept. of Biology, Univ. of Southern California, Los Angeles, California 90007.

<sup>1</sup> Profumo, P. 1969. The gametophyte of *Cystopteris fragilis* and *Cystopteris dickieana*. *Webbia* 23: 317-328.

<sup>2</sup> Hagenah, D. J. 1961. Spore studies in the genus *Cystopteris*. I. The distribution of *Cystopteris* with non-spiny spores in North America. *Rhodora* 63: 181-193.

<sup>3</sup> Larsen, K. 1952. Udbredelsen i Grønland af *Cystopteris fragilis* coll. med piggede og vortede sporer. *Bot. Tidsskr.* 49: 39-44.